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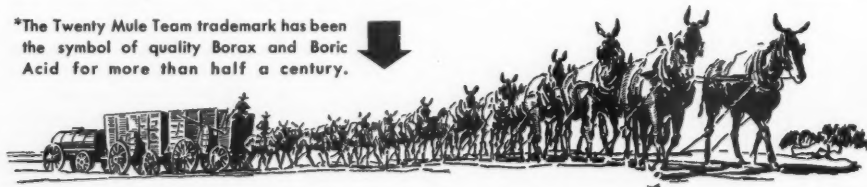
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# AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 94

JUNE 7, 1941

No. 12

## Tomato Plant Production in the South

By JACKSON B. HESTER\*

THE acreage planted with tomatoes in the United States has increased enormously during the past forty years. No doubt this great increase in acreage has been due to the fact that the tomato has a delightfully fresh taste and loses but little of its freshness when canned or processed. Furthermore, the high content of vitamins and the food value are retained in the processed product. The acreage of tomatoes in the northern fields had become so large by 1910 that the question of obtaining a satisfactory source of plants was a major problem.

It has long been recognized that the earlier planted tomatoes produce the largest yields and that the field-grown plants are harder than the average plants grown in hotbeds. Therefore, if a satisfactory source of southern field-grown plants could be obtained, they could be set in the northern fields with safety earlier than the local hotbed-grown plants. This fact was recognized by certain men who began experiments with growing plants in the south. About 1911, R. V. Crine made some early plantings in South Carolina and later began producing plants on a commercial scale in Georgia. In 1913, P. D. Fulwood shipped plants into Indiana which appeared to be a successful venture.

Since these early plantings, the production of plants in Georgia has become quite a successful industry. No small part of this success has been due to the untiring efforts of H. F. Hall and E. C. Williams. They were among the first to recognize the merits of southern-grown plants and their efforts have largely determined the success of the southern plants.

During 1940 there were some 600 to 800 cars and many truck loads of plants shipped from

Georgia to northern farmers. These plants were grown on some 5,000 to 6,000 acres. Such an undertaking has not been without its problems. These problems are three-fold in nature: (a) production; (b) handling; and (c) distribution.

Production is one of the basic problems in the industry but it is only one link in the chain, for if the best plants in the world are not properly pulled, properly packed and distributed immediately, they are unsatisfactory. It requires an all-round grower to understand all of these problems and properly overcome them. It is not the intention of this article to discuss all of these problems but primarily to report upon the work that has been in progress upon production problems.

### Proper Type of Plant

It is next to impossible to describe the proper type of plant for shipment. Knowledge of this comes with long experience in handling plants. Too few people in the plant industry understand what constitutes the proper type of plant for shipment. It is easy to say that the plant must be vigorous, have a good root system and thrive when set in the northern fields. But almost every one has a different idea from such a description as to the type of plant that is being considered. What looks like a good plant in the south may not look the same when it arrives in New Jersey. In fact, in Georgia some plants were rated from one to six, number one being good and six being poor. To the enlightenment of all, number six shipped better than number one and the plants rated as number three were actually the best when they arrived in New Jersey. This means that one must study the situation on both ends to get the true answer as to what constitutes a good

\* Soil Technologist, Campbell Soup Co., Riverton, N. J.

plant. The illustration in Fig. 1 represents an ideal plant for shipment. A plant must be hearty, have a good root system, and above all, it must have sufficient age. Young succulent plants are very unsatisfactory for shipment. They are usually a total loss to the shipper or a great disappointment to the receiver. A plant that is slightly deficient in nitrogen is a desirable type for shipment.

The greater portion of the plants in Georgia are grown in Tift, Grady, Lowndes and adjoining counties. Consequently desirable locations for experiments were near Tifton, Valdosta,

can be followed: (a) land freshly brought into cultivation; and (b) old land that has been properly cropped. In either case the land must be in a good state of cultivation and fairly free from grass seed.



FIG. 1. Desirable type of plant for shipment: good root system, stocky, heavy stem, and good foliage.

Moultrie and Cairo. For the most part the plants are grown on soils of the Tifton and Norfolk groups. Perhaps the former is best suited, as the small iron concretions prevent sand from blowing so seriously at times, which scars the tender tissue of the plants.

#### Selection of Soil

The proper selection of a soil for the production of plants is of prime importance; just any soil is not satisfactory. The soil must be gotten into condition well in advance of planting. There are two general procedures that

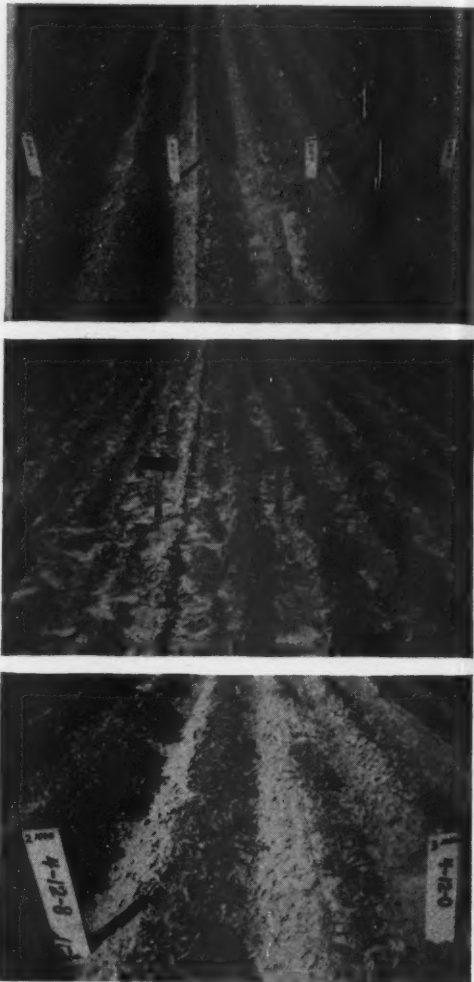


FIG. 2. Illustrations showing the influence of the lack of each plant food element upon the growth of plants. Top, lack of nitrogen; center, lack of phosphorus; bottom, lack of potash.

One of the outstanding properties of the soil is its ability to supply adequate plant nutrients to the growing crop. Data collected during the past three years show that the plant-bed soils are distinctly acid, 86 per cent having a pH value below 6.0 and 35 per cent below 5.5.

Average data for some of the outstanding soils of this section are shown in Table I. These data show that the soils for the most part are rather poorly supplied with the readily available plant nutrients: calcium, magnesium, nitrogen, phosphorus, and potash. This is further substantiated by the fact that, whenever any of the plant-food nutrients are left out of the fertilizer, no salable plants are produced (see Fig. 2). This is often demonstrated to the growers' satisfaction; when the fertilizer machine fails to distribute fertilizer, the results just about equal the results when the seed drill does not distribute seed—no plants at all.

#### Need for Phosphorus

Although all plant nutrients are needed, phosphorus is one of the most essential plant nutrients lacking in the plant-bed soils. Adequate phosphorus develops a heavy root system and a stocky, well-developed stem (see Fig. 3). These factors are highly desirable in a good plant. Since the soils are acid, the problem of maintaining adequate available phosphorus is acute. Acid soils carry soluble iron and aluminum which precipitate the added phosphorus in a form which is unavailable to the plant. Lime, by raising the pH value of the soil, precipitates the iron and aluminum from the soil solution and delays the fixation of phosphorus. For this reason a fertilizer mixture high in superphosphate and high in limestone has been recommended. The fertilizer should be definitely "physiologically basic." In other words, there should be enough limestone in the fertilizer mixture to partially neutralize the acid of the soil in the fertilizer zone as well as completely neutralize the acidity developed by the fertilizer mixture.

#### Liming Practices

General liming of the soil will make it unnecessary to have a basic fertilizer. However, this liming must be done well in advance of planting. Perhaps the most satisfactory method is to lime the crop previous to tomato plants with 1,000 to 2,000 pounds of a good grade of limestone or 750 to 1,500 pounds of hydrated lime. This lime must be thoroughly mixed with the soil if it is to accomplish the purpose for which it is applied. Lime does not readily leach into the soil, consequently it must be plowed into it. However, available data indicate that enough lime can be incorporated with the fertilizer mixture to take care of the lime needs. This does not eliminate the fact that a good sound liming program should be followed by the growers.

Liming to produce a satisfactory pH value (pH 6.0 to 6.5) in the soil increases the availability of phosphorus and causes an increase in the number and activity of micro-organisms in the soil that fix nitrogen from the atmosphere and those that change the nitrogen to the available form (nitrate form). Consequently with a properly limed soil it is not necessary to apply as much nitrogen and phosphorus in growing plants. So, with proper liming the cost of fertilizer should be lower. Liming experiments for the past three years have revealed this fact. In other words, the plants have been more vegetative where the lime was used, showing that with the lime less nitrogen and perhaps less phosphorus was required to be added. One experiment showed that on a soil with a pH value of 5.4 one thousand pounds of limestone or 750 pounds of hydrated lime increased the amount of nitrate nitrogen

Table I  
Some of the Chemical Qualities of Plant Bed Soils

| Soil Type            | Horizon | Color                        | pH in             |       | Per Cent Organic Matter | Pounds per Acre, 0-6 in. |     |                  |       |                               |       |
|----------------------|---------|------------------------------|-------------------|-------|-------------------------|--------------------------|-----|------------------|-------|-------------------------------|-------|
|                      |         |                              | H <sub>2</sub> O* | KCl** |                         | CaO                      | MgO | K <sub>2</sub> O | N     | P <sub>2</sub> O <sub>5</sub> | H†    |
| Tifton sandy loam    | A 0-6   | Grayish yellow‡              | 5.0               | 4.15  | 2.7                     | 840                      | 128 | 34               | 630   | 322                           | 1,680 |
|                      | B 6-20  | Light yellow                 | 4.9               | 4.2   | 0.4                     | 220                      | 144 | 25               | 210   | 211                           | 896   |
|                      | C20-    | Mottled gray, red and yellow | 4.7               | 4.1   | 0.1                     | 196                      | 122 | 25               | 91    | 161                           | 1,344 |
| Norfolk sandy loam   | A 0-7   | Grayish yellow               | 5.0               | 4.05  | 1.7                     | 616                      | 134 | 25               | 602   | 248                           | 1,568 |
|                      | B 7-36  | Yellow                       | 4.8               | 4.15  | 0.2                     | 252                      | 134 | 25               | 140   | 422                           | 1,568 |
|                      | C36-    | Mottled gray, red and yellow | 4.8               | 4.1   | 0.1                     | 336                      | 186 | 34               | 392   | 384                           | 1,680 |
| Red Bay sandy loam†† | A 0-7   | Brown                        | 6.4               | 5.6   | 2.2                     | 1,960                    | 284 | 178              | 616   | 954                           | 504   |
|                      | B 7-30  | Reddish brown                | 6.45              | 5.6   | 0.4                     | 1,344                    | 232 | 42               | 224   | 608                           | 392   |
|                      | C30-    | Red                          | 4.75              | 4.1   | 0.2                     | 560                      | 196 | 34               | 476   | 608                           | 1,288 |
| Blakely sandy loam†† | A 0-8   | Chocolate brown              | 5.85              | 4.9   | 1.0                     | 1,400                    | 244 | 102              | 1,008 | 1,662                         | 1,008 |
|                      | B 8-60  | Red                          | 6.0               | 5.3   | 0.2                     | 1,680                    | 420 | 34               | 280   | 1,190                         | 728   |
|                      | C60-    | Reddish yellow               | 4.8               | 4.2   | 0.05                    | 784                      | 210 | 25               | 280   | 1,538                         | 1,064 |

\* One soil—two water ratio (glass electrode).

\*\* N/2 potassium chloride solution.

† H acidity in terms of calcium oxide neutralizing power.

†† Soils on which a very small acreage occurs.

‡ Manganese and iron concretions.

in the soil more than three times that of the unlimed soil. That means if the plant on the unlimed soil was getting enough nitrogen, the plant on the limed soil was getting three times too much. Actually the one on the unlimed soil was not getting enough but the one on the limed soil was getting too much. This is tremendously important, for too much or too little nitrogen spoils more plants in Georgia than any other nutritional factor.

#### Nitrogen

Nitrogen fertilization as mentioned above is tremendously important in plant production. Furthermore it is the most uncontrollable plant nutrient in the soil. The following things can happen to the available nitrogen: (a) it may be lost by leaching; (b) it may be tied up in the decomposition of large amounts of low nitrogen plant material in the soil (as in new ground or after a large non-leguminous cover crop); (c) it may remain unavailable in a cold, wet soil or a very dry soil; or (d) there may be too much present.

Actually 100,000 plants contain between 10 and 20 pounds of nitrogen, depending upon size and composition. However, 500 pounds of

a 3-12-6 fertilizer mixture actually contains 15 pounds of nitrogen. In 1939 and 1940 a series of experiments using the fertilizer analyses 4-0-8, 4-8-8, 4-12-4, 0-12-8, 3-15-5, 4-12-8, 3-0-6, 3-6-6, 3-12-6, 3-18-6, 3-12-0, 3-12-12, 0-12-6, and 6-12-6 revealed that 500 pounds per acre of a 3 per cent nitrogen fertilizer was about the most satisfactory amount where 12 and 15 per cent phosphoric acid and 6 per cent potash were used. However, these experiments further revealed that the source of nitrogen was very important. For example, see Table 2 and Fig. 4 for information upon this phase of the work. The length of this article does not permit a complete development of this subject.

In one experiment where the fertilizer mixtures containing 0, 3, and 6 per cent nitrogen derived from calnitro was applied two weeks in advance of planting at the rate of 750 pounds to the acre, none of the plants grew large enough to ship. This was due to a lack of nitrogen as the nitrogen leached during a 4-inch rain. However, where 200 pounds of cyanamid were broadcast at the same time that the fertilizer mixture was applied, satisfactory

(Continued on page 24)



| Plant analyses             | Left | Center | Right |
|----------------------------|------|--------|-------|
| Nitrate nitrogen .....     | Good | Fair   | Fair  |
| Phosphorus, $P_2O_5$ ..... | Poor | Fair   | Good  |
| Potash, $K_2O$ .....       | Good | Fair   | Good  |

FIG. 3. Plants on the left have under-developed roots from a lack of fertilizer, particularly phosphorus. The center plants are under-developed from being too thick in the row and having insufficient fertilizer; they are spindly and soft. Plants on the right are of a desirable type.

## The Value of Sodium in Cotton Fertilizers

In Circular 127, issued by the Georgia Experiment Station, the value of the sodium contained in nitrate of soda as applied to cotton has been investigated.

In the course of experimental work during 1939 and 1940 on various sources of nitrogen for cotton, a direct comparison was made between ammonium nitrate and a mixture of nitrate of soda and sulphate of ammonia. The nitrogen in each case was of the same amount in the same forms (one-half nitrate nitrogen, one-half ammonia nitrogen). In addition to these sources of nitrogen, the fertilizer used consisted of ammoniated superphosphate (40 pounds anhydrous ammonia to 1,000 pounds 20% superphosphate), 60% muriate of potash, and anhydrous magnesium sulphate (At rate of 7.5 pounds  $MgO$  per acre). The rate of application was 600 pounds of a 5-10-5 mixture per acre. The results for the two years are shown in Table 1.

The increased yields shown in Table 1 are not due to form of nitrogen, for there was no difference, as noted above. Neither were there any great differences in solubility or valency. Physiological acidity does not explain the difference in yield, as the higher-yielding nitrate of soda-sulphate of ammonia mixture was actually more acid than the ammonium nitrate fertilizer, although the difference was small (4.3 pounds  $CaCO_3$  equivalent per acre). The other differences in the fertilizers were that the half-and-half mixture had the greater total salt concentration and carried sulphate and sodium ions that were not contained in the ammonium nitrate fertilizer.

Both fertilizers contained over 150 pounds of sulphate ions per acre from super-

phosphate, not including that from the sulphate of ammonia in the half-and-half mixture. The extra 35 pounds of sulphate ions carried by the half-and-half mixture should have little if any positive effect upon yield. The other factor was the sodium ion, which was not contained in the ammonium nitrate fertilizer. The half-and-half mixture contained 19.4 pounds of sodium ions, or 26.1 pounds  $Na_2O$  per acre. This would be the molecular equivalent of 40 pounds  $K_2O$  per acre.

The results of the investigation are summarized as follows:

The value of sodium in nitrate of soda is shown by a comparison of a fertilizer in which half the nitrogen was obtained from nitrate of soda and half from sulphate of ammonia, with a fertilizer in which the nitrogen was derived from ammonium nitrate. The increased yield of the former over the latter (average 55 pounds seed cotton per acre, or 6 per cent) was significant, and probably due to the sodium ion.

Further investigation has shown that sodium is of distinct value to cotton on soils which respond to potash fertilization, but of no benefit on soils plentifully supplied with potash. When there are benefits from sodium, these benefits may be about 40 per cent as great as benefits from equivalent amounts of potassium.

It is concluded that the sodium ion in nitrate of soda is a valuable plant nutrient. Sodium will substitute in part for potassium when there is an insufficient amount of that element available to the crop. Nitrate of soda is an excellent and convenient source of sodium. The presence of the sodium ion is a factor which should influence the choice of a nitrogen source for cotton on soils which respond to potash fertilization.

Table 1  
Comparative Yields of Seed Cotton Obtained from Ammonium Nitrate and a Mixture of One-Half Nitrate of Soda and One-Half Sulphate of Ammonia

| Reaction of the Fertilizer Mixture | Soil Reaction pH | Seed Cotton per Acre    |           |          |   |           |          |                                |                        |                       |
|------------------------------------|------------------|-------------------------|-----------|----------|---|-----------|----------|--------------------------------|------------------------|-----------------------|
|                                    |                  | Yield, Ammonium Nitrate |           |          | Yield, ½ Nitrate of Soda, ½ Sulphate of Ammonia |           |          | Increase over Ammonium Nitrate |                        |                       |
|                                    |                  | 1939 lbs.               | 1940 lbs. | Av. lbs. | 1939 lbs.                                       | 1940 lbs. | Av. lbs. | 1939 <sup>3</sup> lbs.         | 1940 <sup>4</sup> lbs. | Av. <sup>5</sup> lbs. |
| Acid <sup>1</sup> .....            | 5.3              | 886                     | 808       | 847      | 943   | 865       | 904      | 57                             | 57                     | 57                    |
| Acid <sup>1</sup> .....            | 6.2              | 902                     | 895       | 899      | 987   | 973       | 980      | 85                             | 78                     | 81                    |
| Neutral <sup>2</sup> .....         | 5.3              | 904                     | 882       | 893      | 929   | 916       | 923      | 25                             | 34                     | 30                    |
| Neutral <sup>2</sup> .....         | 6.2              | 928                     | 905       | 917      | 958   | 982       | 970      | 30                             | 77                     | 53                    |
| Average .....                      | ...              | 906                     | 873       | 890      | 955   | 934       | 945      | 49                             | 61                     | 55                    |

<sup>1</sup> The ammonium nitrate fertilizer had an equivalent acidity of 49.4 pounds  $CaCO_3$  per acre, the half nitrate of soda-half sulphate of ammonia mixture 53.7 pounds  $CaCO_3$  per acre.

<sup>2</sup> Equivalent acidity neutralized with high-grade calcic limestone.

<sup>3</sup> 32 pounds difference required for significance at odds of 19 to 1, 42 pounds at odds of 99 to 1.

<sup>4</sup> 26 pounds difference required for significance at odds of 19 to 1, 34 pounds at odds of 99 to 1.

<sup>5</sup> 29 pounds difference required for significance at odds of 19 to 1, 38 pounds at odds of 99 to 1 (arithmetic average of the two years).

## Manufacture and Uses of Cyanamid\*

Production and applications of cyanamid and the development of valuable derivatives from it, were discussed by S. R. Frost, Sales Director, North American Cyanamid, Ltd., at a meeting of the Hamilton Chemical Association, held at McMaster University, Hamilton, Ontario, on March 12th.

In the manufacture of cyanamid the principal raw materials are limestone, coke and nitrogen from the air, plus an ample supply of electric power. In spite of the fact that one writer declared the cyanamid process to be obsolete in 1916, more cyanamid is manufactured today than ever before, and new derivatives are continually being added to the list.

### Raw Materials

Limestone required in the process comes from the quarries at Beachville, Ont., where a calcium carbonate 98.5 per cent pure and very uniform in quality is available. This valuable deposit of Detroit limestone is about 100 feet deep and does not carry a very heavy burden at the point where the North American Cyanamid quarry is located. The limestone is very soft and up to 15 tons of dynamite is used in one blast to roll out as much as 150,000 tons of rock.

The limestone for the process must have a very even size in order to be treated effectively in the rotary kiln. The amazing thing about it is that, with uneven sizes of limestone, the large pieces are burned in the kiln while the smaller ones are not. A plant at the quarry produces uniform size material for the kilns and a pulverizing plant produces finely ground material for various purposes, including Portland cement, animal feed, agricultural limestone for application to the land, and, when ground to a very fine mesh with 10 microns average size, a filler for mechanical rubber goods, linoleum, etc.

It has not been necessary to produce coke at the plant to the present time, since it has been possible to economically buy coke of the fairly porous and reactive type required. The third important raw material—nitrogen from the air—presents no problem other than that of the necessary plant for its separation.

Nitrogen is produced by a liquid air process in which the air is compressed to 400-lb. pressure with three-stage compressors, employing water-cooling between the stages. A caustic

spray is used to remove carbon dioxide which would cause plugging of the equipment. The liquid air is fractionated in a special distillation column to achieve a very complete separation with pure nitrogen coming off, while the oxygen contains only a very small percentage of nitrogen. Although the plant uses 400 tons of air per day, it has been calculated that the air above the 75-acre area of the plant grounds would supply requirements of a thousand years. At the present time no use is made of the oxygen.

### Process

On arrival at the plant, limestone is fed into rotary kilns 125 ft. long, fired at a temperature of 2,400° F. with powdered coal. The coke, which is combined with the calcium oxide in electric furnaces to form calcium carbide, is dried in large rotary dryers. On completion of the reaction, calcium carbide is tapped from the electric furnace and ground so that 80 per cent passes 200-mesh. The reaction of the calcium carbide with nitrogen takes place in specially designed ovens, and the reaction is started by means of an electric pencil. Once the reaction is under way, it proceeds without further heat, the carbide fusing and taking up nitrogen to form cyanamid. On cooling, the fused cyanamid is ground in a large hammer mill with a 14" shaft carrying 250-lb. hammers. The crushed material is hydrated to removed free lime or carbide and is prepared for shipping by adding a little mineral oil to prevent dust or by granulating.

### Applications

The principal use of cyanamid is as a source of nitrogen. Chemically it occupies an interesting position, standing half-way between the organic and inorganic field and from it one can easily produce ammonia or urea. The greatest use of cyanamid is as a fertilizer. Apart from being a valuable source of nitrogen, its alkalinity neutralizes the free phosphoric acid of superphosphates which would tend to rot the bags and cause other trouble in mixed fertilizers.

The nitrogen of cyanamid is not directly available as plant food but is transformed in the soil into forms in which plants can assimilate it.

By a second fusion of the cyanamid, calcium cyanide is produced. This material has its greatest use in the recovery of gold from ores, and in the production of insecticides.

\* Reprinted from "Canadian Chemistry and Process Industries," April, 1941.

### COTTONSEED MEAL USED AS FERTILIZER ON COTTON FARMS

Considerably more cottonseed meal is expected to be used as fertilizer on cotton farms in the South in 1941 than in 1940 according to the estimates of the U. S. Agricultural Marketing Service. The quantity indicated for use in 1941 is approximately 111,000 tons as compared with 75,000 tons in 1940. The 10-year (1930-39) average quantity is 180,000 tons. The low year was 1940, and the high year was 1932, in which approximately 465,000 tons were used.

The quantity utilized for fertilizer fluctuates from year to year, apparently depending upon the price of cottonseed meal relative to the prices of other livestock feed and of other nitrogenous fertilizers.

The indicated quantities of cottonseed meal used for fertilizer are based upon reports from crop correspondents with respect to the utilization of cottonseed and of cottonseed meal. These reports are used also in determining the proportion of cottonseed which is sold from farms, the quantity which is exchanged for cottonseed meal at the gin or oil mill, and the quantity which is retained on the farm for seed, feed, and fertilizer.

The indicated quantities of cottonseed meal used as fertilizer serve only as a rough measure of the amounts used, and should not be regarded as definite estimates. Since no information of any kind is received from other than cotton farms, the data relate only to farms producing cotton. Additional quantities of cottonseed meal undoubtedly are used as fertilizer on other farms. In 1937, this additional use came to about 41,000 tons, principally by fertilizer manufacturers in mixtures.

#### *Cottonseed Meal Used as Fertilizer on Cotton Farms*

| State               | 10-Year<br>Average,<br>1930-39<br>Tons | 1940<br>Tons | 1941<br>Tons |
|---------------------|--|--------------|--------------|
| Missouri .....      | 464                                    | 0            | 0            |
| Virginia .....      | 408                                    | 150          | 60           |
| N. Carolina .....   | 47,807                                 | 21,320       | 39,360       |
| S. Carolina .....   | 40,189                                 | 21,670       | 33,540       |
| Georgia .....       | 31,345                                 | 8,950        | 13,470       |
| Florida .....       | 2,886                                  | 620          | 900          |
| Tennessee .....     | 972                                    | 600          | 900          |
| Alabama .....       | 19,134                                 | 3,490        | 7,290        |
| Mississippi .....   | 8,530                                  | 5,640        | 3,340        |
| Arkansas .....      | 5,499                                  | 3,770        | 1,340        |
| Louisiana .....     | 5,946                                  | 3,320        | 1,420        |
| Oklahoma .....      | 1,052                                  | 700          | 360          |
| Texas .....         | 15,430                                 | 5,070        | 8,660        |
| United States ..... | 179,662                                | 75,300       | 110,640      |

### UNION POTASH & CHEMICAL CO. ISSUE PRICES

The Union Potash and Chemical Co. have issued prices for agricultural potash salts for the 1941-1942 fertilizer season as follows:

Muriate of potash, 60 per cent  $K_2O$  minimum, 53½ cents per unit  $K_2O$ .

Muriate of potash, 50 per cent  $K_2O$  minimum, 55 cents per unit  $K_2O$ .

Sulphate of potash, 90-95 per cent  $K_2SO_4$ , basis 90 per cent  $K_2SO_4$ , \$36.25 per net ton.

Sulphate of potash magnesia, minimum 40 per cent  $K_2SO_4$ , \$18.50 per cent  $MgO$ , \$26.00 per net ton.

The above prices are in bulk ex vessel at the principal Atlantic and Gulf ports. At buyer's option, muriate may be purchased f.o.b. Carlsbad, New Mexico, in bulk, at a reduction of 11.2 cents per unit  $K_2O$ .

Seasonal discounts are the same as quoted by other companies: 8 per cent on orders placed prior to July 1, 1941 for delivery in equal monthly quantities to March 31, 1942; and an additional 4 per cent upon completion of the entire tonnage contracted for.

### DROP IN SULPHATE OF AMMONIA PRODUCTION

The U. S. Bureau of Mines figures for by-product sulphate of ammonia showed a production of 57,917 tons during April; a drop of 10 per cent from March figures of 64,524 but 6 per cent higher than the April, 1940, output of 54,570 tons. For the first four months of the year, production totaled 245,469 tons, about 9 per cent over the same period of 1940, which amounted to 224,496 tons.

By-product ammonia liquor showed an output of 2,584 tons ( $NH_3$  content) during April, compared with 2,745 tons during March and 2,164 tons during April, 1940. For the January-April period, the totals were 10,333 tons in 1941 and 9,086 tons in 1940.

### PEAT PRODUCTION INCREASES

An increase of 26 per cent in the output of peat during 1940 is reported by the U. S. Bureau of Mines. Domestic production totaled 70,097 short tons, compared with 55,483 tons in 1939. Imports dropped from 78,611 tons in 1939 to 21,689 tons in 1940. Of the total sales of peat during 1940 about 93 per cent was used for soil improvement; only 2 per cent was used in mixed fertilizers.

## THE AMERICAN FERTILIZER

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A. A. WARE, EDITOR

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## Stabilized Prices Pay

By the first of June, practically every company supplying chemical fertilizer materials had announced their prices for the 1941-1942 fertilizer year. With only a few minor exceptions, the prices prevailing during the past season have been continued for the coming year.

Several factors have contributed in bringing about this stabilization. Of principal importance is the fact that this country is now self-sufficient in every principal fertilizer material. In the nitrogen industry, the advances made since the last war in the production of synthetic materials have given us a nitrogen capacity, supplemented by Chilean nitrate, to fill every requirement for fertilizer and munitions. The development of a domestic potash industry, with a capacity to take care of this country's needs, is one of the outstanding industrial stories of this century. In phosphates, there has always been an abundance.

The efforts of the government, through Mr. Henderson and his OPM, to keep material prices at reasonable levels have met with effective cooperation from producers. Even before the governmental machinery was set up, potash companies were accepting orders from bona fide users only and were requiring assurance that none of the material purchased would be used for speculative purposes.

A comparison of present prices with those of the former war period shows the following interesting figures:

|                             | Dec.,<br>1913 | Peak<br>1918-1920 | May,<br>1941 |
|-----------------------------|---------------|-------------------|--------------|
| Ammonium sulphate (ton) ..  | 59.00         | 157.00            | 29.00        |
| Nitrate of soda (ton) ..... | 44.00         | 110.00            | 27.00        |
| Muriate of potash (unit) .. | .80           | 7.30              | .53½         |
| Phosphate rock (ton) .....  | 3.00          | 12.00             | 1.90         |
| Blood, dried (unit) .....   | 3.30          | 8.75              | 3.25         |
| Bones, raw (ton) .....      | 28.00         | 62.50             | 34.00        |
| Fish scrap (unit) .....     | 3.60          | 7.50              | 4.25         |
| Tankage (unit) .....        | 2.45          | 7.25              | 3.75         |
| Sulphur (ton) .....         | 22.00         | 75.00             | 16.00        |

That the industry as a whole has benefited by this price stabilization is demonstrated by the current figures for fertilizer consumption, which show that more fertilizer was used in 1940 than in any previous year, and moreover that the plant food content per ton is increasing steadily each year.

Anyone, whether manufacturer, farmer, or consumer, will be inclined to increase his expenditures if he can plan them ahead, with reasonable assurance that prices will not "jump over the moon" next week or next month.

### I. A. C. TO MOVE OFFICES

The general offices of the International Agricultural Corporation will be moved from New York to Chicago around July 1st. The company has leased the 29th floor of the Civic Opera Building in the latter city.

The offices of their subsidiary companies, Union Potash & Chemical Company, Phosphate Recovery Corporation, and Kyanite Products Corporation, will also be moved to Chicago. The Atlanta sales division offices will be continued at East Point, Ga., although some of the southern sales executives will be transferred to Chicago. A sales office will be maintained in New York City.

### MICHIGAN FERTILIZER PAYS

An article in "The Michigan Farmer," April 12th, points out that although the per capita income per farm in Michigan was \$1,311 in 1940, less than \$30 per capita was spent for fertilizer. "While practically every other commodity the farmer buys has registered a sharp increase in price since 1933, the level of fertilizer prices has remained low," states the article. "The chief reason for this low level of fertilizer prices in the face of advances by other commodities is that research carried on constantly by fertilizer producers and the Government has achieved better and cheaper methods of manufacture. The economies and improvements have been passed on directly to the farmer."

### FARM INCOME INCREASING

Cash farm income in April, including Government payments, amounted to \$709,000,000 compared with 681 millions in March and 627 millions in April last year. January-April income totaled \$2,776,000,000 compared with 2,616 millions in the corresponding period of 1940.

### U. S. BULLETIN ON PLANT FOOD

The U. S. Department of Agriculture has published a 164-page bulletin entitled "The Mineral Composition of Crops, with Particular Reference to the Soils on which They were Grown" which contains tables showing the removal from the soil of various plant foods, covering major and most of the minor elements. This Miscellaneous Publication No. 369 can be obtained from the Supt. of Documents, Washington, D. C. for 20 cents.

### CONSENT DECREE IN NITROGEN ANTI-TRUST SUIT

On May 29th, the U. S. District Court for the Southern District of New York and a number of companies producing and selling fertilizer nitrogen entered into a consent decree, whereby methods of procedure satisfactory to the government were established. The materials covered by the decree include nitrate of soda, sulphate of ammonia, anhydrous ammonia, uramon, nitrogen solutions of various types.

The companies agree not to fix, determine, maintain or adhere to prices on fertilizer nitrogen sold by them to others. The present producer plan of distribution is to be discontinued and the companies are enjoined from setting the re-sale price of nitrate of soda after July 1, 1943, but this date will be subject to change under certain specified conditions.

The companies may continue to quote prices on fertilizer nitrogen f.o.b. certain specified ports but they must also offer an alternative price f.o.b. point of production. They are forbidden to discriminate in price on the sale of sulphate of ammonia to farm cooperatives by refusing to give them quantity or seasonal discounts given to other fertilizer manufacturers under similar conditions.

### SOIL TEST TROUBLE SHOOTERS

In answer to the question "Are soil tests reliable guides to fertilizer practice?" New Jersey agronomists say, "The test for acidity (pH) is the most dependable. If the soil is too acid for the crop which is to be grown, the yield will not be satisfactory no matter what fertilizer is used. If enough lime is applied to destroy all the acid, the availability of the plant food already in the soil will be greatly increased, and much less fertilizer need be used. If, after the lime and fertilizer has been applied, the crop does not grow satisfactorily, the only quick means of finding out wherein the trouble lies is by testing the soil, or testing the tissues of the crop which is growing on it. The difficulty may lie in having used too much lime or fertilizer, as is frequently the case in greenhouses. It may be due to a lack of such elements as boron, copper, manganese, magnesium or zinc, all of which are required by most plants but may not have been present in the fertilizer which was applied. It is as a trouble-shooter that the soil and plant testing laboratory is most effective."

## Nitrogen Capacity Adequate

Potential capacity in the United States for the production of nitrogen, a principal constituent of explosives and fertilizers, soon will reach 800,000 short tons a year as compared with a production of 424,000 tons in 1939 according to estimates contained in a report submitted on May 31st by Dr. R. R. Sayers, Director of the Bureau of Mines, to Secretary of the Interior Harold L. Ickes.

With construction of three synthetic chemical nitrogen plants now under way and a contemplated increase of by-product nitrogen as a result of additions being made to the capacities of by-product coke oven plants, it is estimated that sufficient capacity should be available within the country to make the United States independent of imports of chemical nitrogen.

Before this projected capacity becomes available, however, the Bureau states, a considerable portion of our normal requirements of chemical nitrogen will have to be supplied by imports. Even when the full capacity of presently planned synthetic nitrogen plants becomes available, imports may nevertheless be needed in the event of a national emergency.

Of the chemical nitrogen used in this country, according to the report, nearly one-half now is produced synthetically from the nitrogen of the air, about one-third is imported and the remainder is obtained as a by-product of the manufacture of coke.

Well over half of the imports of chemical nitrogen in the United States in former years have come from Chile in the form of sodium nitrate, but owing to the cessation of such imports from Europe the proportion imported from Chile has jumped to about three-fourths. The bulk of the remaining nitrogen imports into the United States come from Canada in the form of calcium cyanamid.

The report shows that production of mixed nitrogen (from the air) in the United States for 1939 was 280,000 tons, but by substantial modernization or alteration of existing equipment capacity could be substantially increased to about 410,000 tons a year with the new plant construction. These synthetic ammonia plants (including the rehabilitation of United States Nitrate Plant No. 2 at Muscle Shoals) are under construction. On completion of this program of expansion, the combined production capacity of synthetic chemical nitrogen plants will be about 600,000 tons a year.

The production of by-product chemical nitrogen ordinarily depends largely on the manufacture of coke which in turn depends largely on the output of iron and steel. Because of substantial additions being made to the capacities of by-product coke oven plants, maximum capacity for production of by-product nitrogen very likely will be about 190,000 tons annually.

Total potential domestic capacity for both synthetic and by-product nitrogen, therefore, will soon approach, the Bureau estimates, double the output of 424,000 tons in 1939.

Ordinarily almost three-fourths of the total domestic consumption of chemical nitrogen is in fertilizers, the remainder being used in industry and for the manufacture of explosives. The increased use of chemical nitrogen in the manufacture of explosives is expected, however, to alter these proportions to some degree.

A discussion of nitrates, together with statistical data on sources of chemical nitrogen, imports and distribution of products, may be found in Bureau of Mines Information Circular 7170, "Nonmetallic Minerals Needed for National Defense—Nitrates," by Alvin H. Schallis. Copies may be obtained free of charge by writing directly to the Bureau of Mines, United States Department of the Interior, Washington, D. C.

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## FERTILIZER MATERIALS MARKET

### NEW YORK

**Sulphate of Ammonia Prices Announced for 1941-1942 Season. No Advance on Contract Prices. Chilean Nitrate Prices Awaited.**

*Exclusive Correspondence to "The American Fertilizer."*

NEW YORK, June 3, 1941.

Producers and certain distributors of sulphate of ammonia met in Washington last Thursday at the office of the Price Administration and Civilian Supply and the reports of the meeting are quite generally known.

#### Sulphate of Ammonia

Shortly after this meeting, the new price schedule for sulphate of ammonia was announced. The general price, for either a 10 or 12 months' contract, that is July, 1941, through April, 1942, or July through June, 1942, is \$28.00 per net ton, in bulk, basis f.o.b. cars at producing points or \$29.00, f.o.b. cars Atlantic or Gulf ports. Contract would specify shipments in carload quantities in approximately even monthly quantities over the period. Price in the Middle West, that is, Ohio, Indiana, Illinois, Michigan, Kentucky, Wisconsin, also points in West Virginia located on the Ohio River, is \$29.00 per ton, bulk, basis delivered buyer's siding, or \$28.00, f.o.b. producing point, whichever is cheaper. For shipments to Puerto Rico schedule quotes, for contracts as above mentioned, \$29.00 per 2,000 lb. in bulk, f.a.s. New York or Baltimore. On any of the above, for spot delivery or short term contracts, the price is \$1.00 per ton higher. Up to now no price has been announced for bagged material.

#### Potash

Regarding potash, the schedule as previously given is correct, although one of the prominent producers advanced the price on 50% muriate to 58 cents per unit but subsequently reduced the price again to the 56 cent price which had previously been announced by him and which was the price quoted by the other large producers.

#### Nitrate of Soda

Although the price schedule has been announced by the manufacturers of domestic nitrate of soda, the importers of Chilean nitrate

have not as yet announced any prices for the new season.

#### Nitrogen Solutions

The price for B Liquor has not yet been announced but it has been indicated that the price will be  $\frac{1}{4}$  cent per pound higher than last year's schedule.

### ATLANTA

**New Prices on Sulphate of Ammonia Show No Advance. Large Attendance at N.F.A.**

**Convention Expected.**

*Exclusive Correspondence to "The American Fertilizer."*

ATLANTA, June 2, 1941.

Sulphate of ammonia prices were issued as of Saturday. The 10 to 12 months basis is \$28.00 coven or \$29.00 port for equal monthly deliveries. For specific months, the price is \$1.00 per ton higher. It was felt for a while that higher prices might be issued, but on the insistence of the Government, prices are as quoted above.

The Fertilizer Convention is to be held at White Sulphur Springs, West Virginia on June 9th, 10th and 11th and quite a turn out is expected. These meetings offer a splendid opportunity for the various members of the Association and their friends to get together and exchange ideas and everyone comes away with a feeling that they have at least rubbed elbows with kindred souls. Incidentally, White Sulphur Springs is ideally situated for conventions of this kind and the turn out this year should be one of the largest on record.

The markets generally are as follows:

*South American Blood.*—\$3.25 (\$3.95 per unit N), c.i.f.

*Tankage.*—\$3.40 (\$4.13½ per unit N) and 10 cents, c.i.f.

*Domestic Nitrogenous.*—\$2.00 (\$2.43 per unit N), f.o.b. western producing points.

*Fish Materials.*—Acidulated scrap, last sales \$3.50 (\$4.25½ per unit N) and 50 cents, f.o.b.

# FERTILIZER MATERIALS



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on Your Requirements of These Materials*

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- SUPERPHOSPHATE
- DOUBLE  
SUPERPHOSPHATE
- NITRATE of SODA
- SULPHURIC ACID
- SULPHATE of  
AMMONIA
- BONE MEALS
- POTASH SALTS
- DRIED BLOOD
- TANKAGES
- COTTONSEED MEAL
- BONE BLACK
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Greensboro, N. C.  
Havana, Cuba

Houston, Texas  
Jacksonville, Fla.  
Montgomery, Ala.  
Nashville, Tenn.  
New Orleans, La.  
New York, N. Y.

Norfolk, Va.  
Presque Isle, Me.  
San Juan, P. R.  
Sandusky, Ohio  
Wilmington, N. C.

producing points, with dried scrap bringing as high as \$60.00 per ton, Florida production points.

*Sulphate of Ammonia.*—New prices issued Saturday, \$28.00 ovens, \$29.00 ports, 10 to 12 months basis; specific months \$1.00 per ton higher.

*Nitrate of Soda.*—Unchanged.

*Cottonseed Meal.*—Prime 8 per cent, \$25.00, Memphis; southeastern mills, \$26.50.

## BALTIMORE

Manufacturers Contracting for Material for Next Season. Prices Remain at Prevailing Levels.

Burlap Bag Prices Advance.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, MD., June 3, 1941.

Now that the spring shipping season is over, many of the manufacturers are taking inventory of their stocks and some of them have already covered for their supplies of raw material for another season. There have not been any outstanding features in the market during the past two weeks.

*Ammoniates.*—The price of tankage for feeding is ruling slightly easier, being around \$3.65 per unit of nitrogen and 10 cents per unit of B.P.L., f.o.b. basis Baltimore. South American ground dried blood, however, for future shipment is also ruling easier at around \$3.40 per unit of nitrogen, c.i.f. Baltimore.

*Nitrogenous Material.*—There is very little activity in this article, and the market continues nominal at \$2.75 per unit of nitrogen, f.o.b. Baltimore.

*Sulphate of Ammonia.*—It is reported that producers and distributors of this commodity for fertilizer purposes have been requested by the office of Price Administration and Civilian

Supply to continue formal price quotations which were in effect during the season just closing, namely, \$28.00 per ton at inland producing points and \$29.00 at the port, for equal monthly shipments, with spot price \$1.00 per ton higher. With increased production of steel mills and reluctance of Government authorities to encourage exports, it would now seem that there should be ample supplies to take care of fertilizer manufacturing requirements during the coming season.

*Nitrate of Soda.*—While importers of the Chilean brand have not announced prices for another season, domestic producers are continuing quotations in bulk unchanged over the last six months of this year. The present price in 100-lb. bags is \$29.40 per ton of 2,000 lb., ex port warehouse until the end of this month. The price in bulk is \$27.00.

*Fish Scrap.*—There is very little activity in this material, but further limited sales have been reported at the equivalent of \$5.30 per unit of nitrogen and 10 cents per unit of B.P.L., f.o.b. fish factories, for shipment if and when made, but on account of the disparity in the price of fish meal as compared with other protein feeding materials, there is less interest than usual being shown in fish scrap at the present time.

*Superphosphate.*—The volume of this material shipped during the past season was quite satisfactory, with result that there is no heavy accumulation being carried over. Although everything entering into the manufacture of this material, including freight and labor, is higher, up to the present time there has not been any change in the market, which is still quoted, subject to change without notice, at \$8.00 per ton of 2,000 lb., basis 16 per cent for run-of-pile, and \$8.50 per ton for flat 16 per cent, no charge for overage, both in bulk, f.o.b. producers' works Baltimore.

Manufacturers' Sales Agents for **DOMESTIC**

# Sulphate of Ammonia

Ammonia Liquor :: Anhydrous Ammonia

**HYDROCARBON PRODUCTS CO., INC.**

**500 Fifth Avenue, New York**

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Chilean

Nitrate of Soda

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Both Guaranteed

16% NITROGEN

Valuable not only as a source of nitrogen, but also to help maintain the supply of other plant food elements *naturally* blended with it.

"Natchel Nitrate,  
Yas[Suh]," says  
Uncle Natchel.



Natural Chilean Nitrate of Soda is the only natural nitrate in the world. It's always reliable.

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**Bone Meal.**—There is very little interest being shown in this commodity which continues scarce. The nominal market on 3 and 50 per cent steamed bone meal remains around \$37.00 per ton, while 4½ and 47 per cent raw bone meal is priced at \$32.50 to \$36.00 per ton, f.o.b. Baltimore.

**Potash.**—Prices have now been announced for next season without any material change except in the case of 50% muriate, which some manufacturers increased 1½ cents per unit, while others advanced price from 53½ cents to 58 cents to discourage the use of 50% grade in favor of the 60% material. The same discounts prevail as previously for early buying and equal monthly shipments, but it is reported that practically all domestic producers will be sold up for their entire production before long.

**Bags.**—Due to unfavorable European war conditions, there have been some heavy advances during the past two weeks amounting to over \$20.00 per thousand, with result that the market has now reached a point where fertilizer can only be shipped in burlap bags at a considerable premium over cost of shipment in paper bags. In consequence of this there is practically no new business being booked at the present high prices which many of the fertilizer manufacturers feel are artificial and highly speculative.

### CHICAGO

Fertilizer Organics Market Quiet but Steady. Buyers Still Holding Off. Feed Market Slow.

Exclusive Correspondence to "The American Fertilizer."

CHICAGO, June 2, 1941.

A quiet but steady market prevails in western organics. Asking prices are somewhat higher than those recently ruling. Sellers hesitate putting out offerings for future, but when they do, the quotations are higher than buyers will reach. A few months ago the market was a buyers' market, but now it appears the opposite is in effect.

The market in feeding materials has been rather slow, but stocks in sellers' hands are light.

Nominal prices are as follows: High grade ground fertilizer tankage, \$2.50 to \$2.75 (\$3.04 to \$3.34½ per unit N) and 10 cents; standard grades crushed feeding tankage, \$3.40 to \$3.50 (\$4.13½ to \$4.25½ per unit N) and 10 cents; blood, \$3.10 to \$3.15 (\$3.77 to \$3.83 per unit N); dry rendered tankage, 72½ to 77½ cents per unit of protein, Chicago basis.

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# PRIZE FOR PREMIUM CROPS...



## USE PLENTY OF SUNSHINE STATE POTASH

● Balanced fertilizers are economical fertilizers. In the case of tobacco, for instance, results definitely prove that considerably more potash than has been applied in the past, can profitably be used to further increase acre values. Potash has a greater influence on quality than any other element in tobacco fertilizer and pays highest dividends to the tobacco grower. Adequate amounts of potash produce a smooth, even leaf of good burning quality which

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Progressive fertilizer producers know it's good business to provide growers of tobacco and all major crops with complete fertilizers containing plenty of potash, compounded to fit the recommendations of local agricultural authorities. They also know that Sunshine State Potash can be relied upon for consistently uniform analysis and careful sizing which makes handling and blending easy.

HIGRADE MURIATE OF POTASH

62/63%  $K_2O$

Also 50%  $K_2O$  Grade

MANURE SALTS

Approximately 30%  $K_2O$



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MENTION "THE AMERICAN FERTILIZER" WHEN WRITING TO ADVERTISERS.

## CHARLESTON

**Nitrate of Soda for Top Dressing in Good Demand.  
Higher Superphosphate Prices Expected.**

*Exclusive Correspondence to "The American Fertilizer."*

CHARLESTON, June 3, 1941.

The nitrate of soda movement picked up in the last day or two, due to some rains in the southeast. This movement will undoubtedly be very heavy in the next three or four weeks.

**Nitrogenous.**—Domestic can be obtained around \$1.90 to \$2.00 (\$2.31 to \$2.43 per unit N), f.o.b. midwestern points.

**Blood.**—Around \$3.15 (\$3.83 per unit N), bulk Chicago; South American around \$3.05 (\$3.70 per unit N), bagged, c.i.f. where freight can be obtained.

**Fish Meal.**—Dried menhaden for future delivery is very strong. Also fish meal is strong.

**Cottonseed Meal.**—Around \$29.00 for 8 per cent at Atlanta and \$25.50 for 8 per cent at Memphis.

**Superphosphate.**—This market is very stiff, some sellers refusing to quote futures on account of the uncertainties of the costs of phosphate rock and sulphur, both of which have advanced.

## TENNESSEE PHOSPHATE

**Drought Hurts Crops and Power Supply but Advances Construction Work. New Concentrated Fertilizer Suggested.**

*Exclusive Correspondence to "The American Fertilizer."*

COLUMBIA, TENN., June 2, 1941.

The most persistent spring drought this part of the country has known, interrupted by very light and infrequent showers which only serve to accentuate its effects, has badly damaged wheat and oats and may yet greatly cut corn and tobacco. It has put spring pasture on about

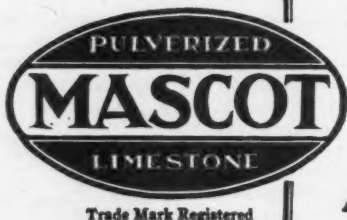
the poorest basis known, though rye and barley are reported showing a splendid crop. Wheat harvest is getting under full swing, as is tobacco setting. Irish potato crops are suffering badly as well as truck and vegetables generally.

The limitation of water for washing purposes has not yet seriously affected the phosphate operations, as they constantly re-use the water after settling, but it is hard to see how the summer rains can now be enough to avoid a very serious situation when the August and September normal decrease of flow of the creeks supplying water comes. The TVA is experiencing great diminution of reserve water for power development, as they have to draw down the reservoir level in the storage lakes, to supplement run of the river power, instead of as usual increasing this level at this time of the year against fall dry weather normally existing.

These same conditions make for rapid progress in the construction work under way at the various phosphate plants, preparing for a large increased capacity by another half year.

Shipments of ground phosphate rock for direct application have cut down, in line with usual falling off in May, June and July, but May shipments were over ten per cent larger than May, 1940, while June and July prospects are for still heavier increase over 1940. As there is a possibility that transportation and other facilities may be commandeered, some farmers who usually use large applications in August and September are considering taking their supplies earlier, even at some inconvenience and extra handling costs.

Moderately active prospecting work is being continued by the International Agricultural Corporation in the large areas of blue and brown rock deposits in Hickman County. As this company would doubtless be the first to exhaust their reserves in Maury County, it is



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natural to expect them to be the first developers of the lower grade but far more extensive tonnages of the Swan Creek, Centerville and Totty's Bend areas in Hickman County and Leatherwood in Western Maury County.

One possibility in the blue rock field, especially in Totty's Bend, is the development of cheaper mining by using the blue rock vein of 20 in. to 3 ft., along with a few feet of overlying shale. This can be used for furnace production of phosphoric acid, with a significant content of nitrogen and potash. By mining and calcining, at the same time, a few feet of the underlying phosphatic limestone carrying 25 per cent  $P_2O_5$ , and by acidulating it with the phosphoric acid, a treble superphosphate, carrying a content of N and  $K_2O$  could be attained.

#### NEW PARITY LOAN BILL INCREASES FARMERS' INCOME

About the most interesting development in the past month with respect to agriculture was the passage by the House and Senate of a bill providing for loans on the major agricultural crops to the extent of 85 per cent parity.

This is especially important to the farmer because, based on present parity relationships, the loans will be considerably above the current prices of most of the crops affected. Wheat, for example, will be about 97 cents, corn about 72 cents, and cotton about 14 cents. The loans, in fact, place a floor under prices of the crops affected and will, of course, result in an increase in the cost of feeds and may temporarily reduce the advantages in feeding live stock for meat and dairy production but it is anticipated that within a short time live stock prices will be adjusted to the new loan schedules. Farm purchasing power will undoubtedly be improved as a result of the passage of this legislation. The farmers

stand to receive a greater proportionate share of the total National income.

It is hard to see just yet how the different agricultural sections of the country will share in the benefits but, as it stands now, it seems that the producers of the staple crops such as cotton, wheat, and corn will receive the greatest relative benefits because the prices of their products have been depressed for some time as a result of large supplies and a record low in export demand.

#### OHIO FERTILIZER AMENDMENTS PROPOSED

A bill to amend the Ohio Fertilizer Law has passed both the House and Senate. The principal change is in the minimum plant food content allowed, which is increased to 18 per cent. Liquid fertilizers are specifically included in the law. Unacidulated mineral phosphates must contain a  $P_2O_5$  content of 30 per cent or more.

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**POSITION WANTED:** Perhaps, due to the National Defense Program, you may need an experienced factory man above the draft age. I have had a lot of experience in this work for the past sixteen years. Can furnish good references and record of performance. Am now employed but for personal reasons desire to make a change at this time. Address "495," care THE AMERICAN FERTILIZER, Philadelphia.

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PEOPLES OFFICE BUILDING  
Charleston, S. C.

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Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

### AMERICAN POTASH & CHEMICAL CORPORATION

70 PINE STREET, NEW YORK CITY

*Pioneer Producers of Muriate of Potash in America*

*See Page 4*

## TOMATO PLANT PRODUCTION IN THE SOUTH

(Continued from page 8)

plants were obtained. Thus the source of nitrogen is very important. Part of the nitrogen must be available to the plant immediately but some must remain in the unavailable state and change to the nitrate form only when the plants

are about ready to ship. The plants should be kept growing at all times, even though very slowly in the final stages.

The fertilizer mixtures carrying, as a source of slowly available nitrogen, granular cyanamid or tankage; as an intermediate source, cottonseed meal, urea or others; and ammonia and

Table 2

*The Influence of Nitrogen Sources Upon Growth of Plants, 1940*

| Fertilizer Used                               | Size and Appearance | Rating | Color        | Pounds per 100,000 Plants |            | Nitrogen | Per Cent Nitrogen |
|---|---------------------|--------|--------------|---------------------------|------------|----------|-------------------|
|   |                     |        |              | Green Weight              | Dry Weight |          |                   |
| All cyanamid                                  | Poor, small         | 6      | Dark green   | 1,250                     | 154        | 5.0      | 3.33              |
| 1/2 each—cyanamid, cal-nitro, cottonseed meal | Stocky, very good   | 1      | Light green  | 2,531                     | 272        | 7.4      | 2.87              |
| All cottonseed meal                           | Stocky, good        | 2      | Light green  | 2,188                     | 259        | 6.5      | 2.66              |
| 1/2 each—cyanamid and nitrate of soda         | Small, fair         | 5      | Dark green   | 1,594                     | 196        | 5.4      | 2.79              |
| All nitrate of soda                           | Fair                | 4      | Medium green | 1,813                     | 228        | 5.4      | 2.41              |
| All calnitro                                  | Fair                | 3      | Medium green | 1,781                     | 205        | 5.0      | 2.48              |



FIG. 4. The influence of various fertilizer mixtures upon the growth of plants.



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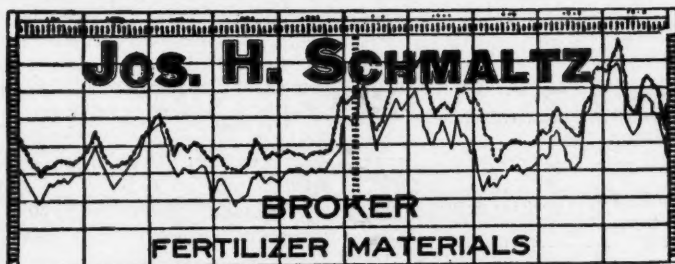
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nitrate forms as a readily available source, appeared to be quite satisfactory. It will be noticed in Table 2 that the mixture containing  $\frac{1}{3}$  cyanamid,  $\frac{1}{3}$  cottonseed meal and  $\frac{1}{3}$  calnitro as the sources of nitrogen was the best mixture used in 1940.

In 1941 this work was enlarged upon and the following five formulas of fertilizer were used in a 3-12-6 ( $\text{N-P}_2\text{O}_5\text{-K}_2\text{O}$ ) fertilizer mixture:

|                                | Pounds |
|--------------------------------|--------|
| I. Superphosphate, 19% .....   | 1,250  |
| Muriate of potash, 50% .....   | 240    |
| Uramon, 42% .....              | 140    |
| Limestone (Mascot) .....       | 370    |
|                                | 2,000  |
| II. Superphosphate, 19% .....  | 1,250  |
| Muriate of potash, 50% .....   | 240    |
| Cyanamid, 21% .....            | 100    |
| Uramon, 42% .....              | 50     |
| Sulphate of ammonia, 20% ..... | 50     |
| Nitrate of soda, 16% .....     | 60     |
| Limestone (Mascot) .....       | 250    |
|                                | 2,000  |
| III. Superphosphate, 19% ..... | 1,250  |
| Muriate of potash, 50% .....   | 240    |
| Cyanamid, 21% .....            | 100    |
| Tankage, 9% .....              | 220    |
| Nitrate of soda, 16% .....     | 120    |
| Limestone (Mascot) .....       | 70     |
|                                | 2,000  |
| IV. Superphosphate, 19% .....  | 1,250  |
| Muriate of potash, 50% .....   | 240    |
| Sulphate of ammonia, 20% ..... | 100    |
| Tankage, 9% .....              | 220    |
| Nitrate of soda, 16% .....     | 120    |
| Limestone (Mascot) .....       | 70     |
|                                | 2,000  |

|                                | Pounds |
|--------------------------------|--------|
| V. Superphosphate, 19% .....   | 1,250  |
| Muriate of potash, 50% .....   | 240    |
| Cyanamid, 21% .....            | 50     |
| Sulphate of ammonia, 20% ..... | 50     |
| Uramon, 42% .....              | 50     |
| Tankage, 9% .....              | 100    |
| Nitrate of soda, 16% .....     | 60     |
| Limestone (Mascot) .....       | 200    |
|                                | 2,000  |

The object was not necessarily to compare the sources of nitrogen but to find a superior fertilizer mixture. The fertilizer mixtures were made using all of the filler as limestone, and inasmuch as the quantity was not the same in all mixtures, this no doubt was a factor. If a mixture permitted the use of more than 200 pounds of limestone which is desirable and does not make it necessary to use a source of nitrogen that is too expensive, the mixture should be satisfactory. Data from this work are shown in Table 3.

There were two other experiments conducted, one on a Norfolk sandy loam and another on a Tifton sandy loam, but these were not greatly different from the one mentioned.

#### Potash

Potash is essential in plant production. It tends to give the plant body. When it is left out of the fertilizer mixture, the plants are not satisfactory for shipment. The illustration in Fig. 2 shows the results on some soils when potash is left out of the fertilizer. Muriate of potash is a satisfactory source of potash and about 5 to 8 per cent seems adequate.

(To be continued in the next issue.)

Table 3  
Source of Nitrogen in Fertilizer Formulas

| Fertilizer Analyses   | No. Plants per Acre | Green Weight of Plants in Pounds | Wt. in Pounds of 125,000 Plants* | Observed Georgia | Rating New Jersey |
|-----------------------|---------------------|----------------------------------|----------------------------------|------------------|-------------------|
| TIFTON SANDY LOAM     |                     |                                  |                                  |                  |                   |
| I                     | 407,500             | 5,000                            | 2,344                            | 1                | 2+                |
| II                    | 525,000             | 5,000                            | 1,875                            | 2                | 3                 |
| III                   | 415,000             | 4,375                            | 2,031                            | 3                | 3                 |
| IV                    | 365,000             | 3,906                            | 1,875                            | 2                | 2                 |
| V                     | 322,000             | 4,062                            | 1,875                            | 1                | 2                 |
| ORANGEBURG SANDY LOAM |                     |                                  |                                  |                  |                   |
| I                     | 325,000             | 2,344                            | 1,098                            | 3                | 2                 |
| II                    | 312,500             | 3,438                            | 1,563                            | 3                | 2+                |
| III                   | 302,500             | 2,344                            | 1,406                            | 3—               | 2+                |
| IV                    | 487,500             | 5,313                            | 2,188                            | 1                | 1                 |
| V                     | 422,500             | 2,656                            | 1,406                            | 2                | 3                 |

\* Salable plants.

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the number of pounds of raw material for a desired per cent. of plant food in a ton of mixed goods—or find what per cent. of a certain plant food in a ton of fertilizer produced by a specific quantity of raw materials.

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How much sulphate of ammonia, containing 20 per cent. of nitrogen, would be needed to give  $4\frac{1}{2}$  per cent. nitrogen in the finished product?

Seven hundred and fifty pounds of tankage, containing 8 per cent. phosphoric acid are being used in a mixture. What per cent. of phosphoric acid will this supply in the finished goods?

Should the Adams' Formula Rule become soiled from handling, it may be readily cleaned with a damp cloth.

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A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"



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Chemical Construction Corp., New York City.

### COPPER SULPHATE

Tennessee Corporation, Atlanta, Ga.

### COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Huber & Company, New York City.  
Jett, Joseph C., Norfolk, Va.  
Schmaltz, Jos. H., Chicago, Ill.  
Taylor, Henry L., Wilmington, N. C.  
Wellmann, William E., Baltimore, Md.

### CRANES AND DERRICKS

Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.  
Link-Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### CYANAMID

American Agricultural Chemical Co., New York City.  
American Cyanamid Co., New York City.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Jett, Joseph C., Norfolk, Va.  
Taylor, Henry L., Wilmington, N. C.  
Wellmann, William E., Baltimore, Md.

### DENS—Superphosphate

Chemical Construction Corp., New York City.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

## Andrew M. Fairlie

CHEMICAL ENGINEER

22 Marietta Street  
Building

ATLANTA, GA.

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Equipment . . . Operation . . . Mills-Packard Water-  
Cooled Acid Chambers, Gaillard Acid-Cooled Chambers,  
Gaillard Acid Dispersers, Contact Process Sulphuric  
Acid Plants.

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Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### DRYERS—Direct Heat

Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### DRIVES—Electric

Link-Belt Company, Philadelphia, Chicago.

### DUMP CARS

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### DUST COLLECTING SYSTEMS

Sackett & Sons Co., The A. J., Baltimore, Md.

### ELECTRIC MOTORS AND APPLIANCES

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### ELEVATORS

Atlanta Utility Works, East Point, Ga.  
Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### ELEVATORS AND CONVEYORS—Portable

Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### ENGINEERS—Chemical and Industrial

Chemical Construction Corp., New York City.  
Fairlie, Andrew M., Atlanta, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### ENGINES—Steam

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### EXCAVATORS AND DREDGES—Drag Line and Cableway

Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.  
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

### FERTILIZER MANUFACTURERS

American Agricultural Chemical Co., New York City.  
American Cyanamid Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Farmers Fertilizer Co., Columbus, Ohio.  
International Agricultural Corp., New York City.  
Phosphate Mining Co., The, New York City.  
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

### FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Huber & Company, New York City.  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Taylor, Henry L., Wilmington, N. C.  
Wellmann, William E., Baltimore, Md.

### FOUNDERS AND MACHINISTS

Atlanta Utility Works, East Point, Ga.  
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### GARBAGE TANKAGE

Wellmann, William E., Baltimore, Md.

### GEARS—Machine Moulded and Cut

Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### GEARS—Silent

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### GELATINE AND GLUE

American Agricultural Chemical Co., New York City.

### GUANO

Baker & Bro., H. J., New York City.

### HOISTS—Electric, Floor and Cage Operated, Portable

Hayward Company, The, New York City.  
Jeffrey Manufacturing Co., The, Columbus, Ohio.

### HOPPERS

Atlanta Utility Works, East Point, Ga.  
Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
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Stedman's Foundry and Mach. Works, Aurora, Ind.

### IMPORTERS, EXPORTERS

Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Wellmann, William E., Baltimore, Md.

### IRON SULPHATE

Tennessee Corporation, Atlanta, Ga.

### INSECTICIDES

American Agricultural Chemical Co., New York City.

### LACING—Belt

Sackett & Sons Co., The A. J., Baltimore, Md.

### LIMESTONE

American Agricultural Chemical Co., New York City.  
American Limestone Co., Knoxville, Tenn.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Wellmann, William E., Baltimore, Md.

### LOADERS—Car and Wagon, for Fertilizers

Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### MACHINEERY—Acid Making

Atlanta Utility Works, East Point, Ga.  
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Chemical Construction Corp., New York City.  
Duriron Co., Inc., The, Dayton, Ohio.  
Fairlie, Andrew M., Atlanta, Ga.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MACHINERY—Coal and Ash Handling

Hayward Company, The, New York City.  
Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### MACHINERY—Elevating and Conveying

Atlanta Utility Works, East Point, Ga.  
Hayward Company, The, New York City.  
Jeffrey Manufacturing Co., The, Columbus, Ohio.  
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### MACHINERY—Power Transmission

Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MACHINERY—Pumping

Atlanta Utility Works, East Point, Ga.  
Durlon Co., Inc., The, Dayton, Ohio.

### MACHINERY—Tankage and Fish Scrap

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MAGNETS

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MANGANESE SULPHATE

McIver & Son, Alex. M., Charleston, S. C.  
Tennessee Corporation, Atlanta, Ga.

### MIXERS

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### NITRATE OF SODA

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Barrett Company, The, New York City.  
Bradley & Baker, New York City.  
Chilean Nitrate Sales Corp., New York City.  
Huber & Company, New York City.  
International Agricultural Corp., New York City.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmaltz, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

### NITRATE OVENS AND APPARATUS

Chemical Construction Corp., New York City.

### NITROGEN SOLUTIONS

Barrett Company, The, New York City

### NITROGENOUS ORGANIC MATERIAL

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
DuPont de Nemours & Co., Wilmington, Del.  
Huber & Company, New York City.  
International Agricultural Corp., New York City.  
McIver & Son, Alex. M., Charleston, S. C.  
Smith-Rowland Co., Norfolk, Va.  
Wellmann, William E., Baltimore, Md.

### NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.

### PACKING—For Acid Towers

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Chemical Construction Corp., New York City.

### PANS AND POTS

Stedman's Foundry and Mach. Works, Aurora, Ind.

### PHOSPHATE MINING PLANTS

Chemical Construction Corp., New York City.

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American Agricultural Chemical Co., New York City.  
American Cyanamid Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
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Jett, Joseph C., Norfolk, Va.  
Phosphate Mining Co., The, New York City.  
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### PIPE—Acid Resisting

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### PIPES—Chemical Stoneware

Chemical Construction Corp., New York City.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

### PLANT CONSTRUCTION—Fertilizer and Acid

Chemical Construction Corp., New York City.  
Fairlie, Andrew M., Atlanta, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### POTASH SALTS—Dealers and Brokers

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Huber & Company, New York City.  
International Agricultural Corp., New York City.  
Jett, Joseph C., Norfolk, Va.  
Schmaltz, Jos. H., Chicago, Ill.  
Taylor, Henry L., Wilmington, Del.  
Wellmann, William E., Baltimore, Md.

### POTASH SALTS—Manufacturers and Importers

American Potash and Chem. Corp., New York City.  
Potash Co. of America, Baltimore, Md.  
United States Potash Co., New York City.

### PULLEYS AND HANGERS

Atlanta Utility Works, East Point, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### PUMPS—Acid-Resisting

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Durlon Co., Inc., The, Dayton, Ohio.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.

### PYRITES—Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.  
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Jett, Joseph C., Norfolk, Va.  
Wellmann, William E., Baltimore, Md.

### QUARTZ

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

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### SCREENS

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### SEPARATORS—Air

Sackett & Sons Co., The A. J., Baltimore, Md.

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### SHOVELS—Power

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### SPRAYS—Acid Chambers

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### SUPERPHOSPHATE

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Ashcraft-Wilkinson Co., Atlanta, Ga.  
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### SUPERPHOSPHATE—Concentrated

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International Agricultural Corp., New York City.  
Phosphate Mining Co., The, New York City.  
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### SYRONS—For Acid

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### TALLOW AND GREASE

American Agricultural Chemical Co., New York City.

### TANKAGE

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
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### TANKAGE—Garbage

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### UREA

DuPont de Nemours & Co., E. I., Wilmington, Del.

### UREA-AMMONIA LIQUEUR

DuPont de Nemours & Co., E. I., Wilmington, Del.

### VALVES—Acid-Resisting

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See Catalog 6-C

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MENTION "THE AMERICAN FERTILIZER" WHEN WRITING TO ADVERTISERS.



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